

# P R O J E C T facts

DEPARTMENT OF ENERGY  
OFFICE OF FOSSIL ENERGY

CLEAN coal  
TECHNOLOGY

## THE MILLIKEN CLEAN COAL TECHNOLOGY PROJECT

### PRIMARY PROJECT PARTNER

**New York State Electric  
and Gas Corporation**  
Binghamton, NY

### MAIN SITE

**Milliken Station**  
Lansing, NY

### TOTAL ESTIMATED COST

**\$158,607,807**

### COST SHARING

**DOE \$45,000,000**

**Non-DOE \$113,607,807**

### Project Description

The Milliken Clean Coal Technology project is demonstrating a combination of innovative pollution-control technologies to remove sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), and trace metal pollutants produced by high-sulfur coal combustion. Integrated into a complete emissions-control process, the advanced system has low operating and maintenance costs, and produces value-added by-products with minimal waste.

The host site, Milliken Station, is located in the Finger Lakes region of New York State on the shore of Cayuga Lake. The project cleans the flue gases of two 150-megawatt boilers. SO<sub>2</sub> pollutants are converted into commercial-grade gypsum. Chlorides are captured and concentrated into a calcium chloride brine by-product. A high-quality flyash is being marketed to the concrete industry. All process wastewater is collected, treated, and recycled into the system, resulting in no liquid discharges.

The unique reinforced concrete, tile-lined, split-vessel design of the system provides a reliable, low-maintenance component compared with the rubber-lined or alloy vessels in conventional scrubbers. The concrete vessel can be constructed directly below or within the base of a power plant stack, saving space in congested sites.

The Milliken project could help usher in a new generation of pollution controls—innovative technologies that apply a comprehensive approach to cleaning power plant emissions at lower costs. In addition, operational efficiency at the site is being maximized by use of an artificial intelligence system.

### Program Goal

Coal represents 94% of proven U.S. fossil fuel reserves—a resource that far surpasses the world's supply of oil. Burning coal to generate power, however, produces harmful emissions associated with acid rain and other forms of pollution. DOE's Clean Coal Technology Program demonstrates how the efficiency and environmental performance of coal-fired power-generating systems can be increased to make them both highly profitable and able to comply with stringent environmental regulations. The Milliken Clean Coal Technology project demonstrates at one site the commercial potential of a linked system of advanced coal-based technologies for domestic and export markets.

# THE MILLIKEN CLEAN COAL TECHNOLOGY PROJECT

## CONTACT POINTS

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## Project Partners

### THE STEBBINS ENGINEERING & MANUFACTURING COMPANY

Watertown, NY  
(technology supplier—  
tile-lined vessel)

### SAARBERG-HOTTER-UMWELTECHNICK GMBH

Houston, TX  
(technology supplier—  
FGD process)

### ABB AIR PREHEATER, INC.

Wellsville, NY  
(technology supplier—heat pipe)

### NEW YORK STATE ENERGY RESEARCH & DEVELOPMENT ADMINISTRATION

(cofunding)

### NALCO FUEL TECH

Naperville, IL  
(technology supplier—  
SNCR system)

### CONSOL, Inc.

Library, PA  
(technical consultant)

### DHR TECHNOLOGIES

Columbia, MD  
(expert system development)

### EMPIRE STATE ELECTRIC ENERGY

### RESEARCH CORPORATION

(cofunding)

### ELECTRIC POWER RESEARCH INSTITUTE

Palo Alto, CA  
(cofunding)

## Project Benefits

Utilities in the 21st century will have to choose technologies that conform to more restrictive air quality standards. These standards will tighten limits on the release of SO<sub>2</sub> and NO<sub>x</sub>—two pollutants that can contribute to acid rain and other environmental problems—and could restrict emissions of trace elements that form air toxics. Reductions in solid and liquid wastes will also be important factors in responsible, economical operation and environmental stewardship.

The Milliken Clean Coal Technology project will provide industry and utilities with environmental emissions-control options that economically remove pollutants and eliminate wastes by generating commercially valuable by-products.

The combined technologies to be demonstrated in the Milliken project are capable of:

- Removing up to 98% of the SO<sub>2</sub> from combustion emissions.
- Removing up to 50% of the NO<sub>x</sub> from combustion emissions.
- Producing market-grade gypsum, calcium chloride, and flyash products.
- Eliminating liquid wastes.
- Saving costs in operation and maintenance compared with existing systems.
- Upgrading to existing and future coal combustion processes.

Construction of the systems created 200 new jobs for two years and generated \$70 million in manufacturing orders or professional services. To operate the technology, 15 permanent jobs have been created at the host site.

## Cost Profile (Dollars in Millions)

	Prior Investment	FY95	FY96	FY97	Future Funds
Department of Energy *	\$36.8	\$7.2	\$0.5	\$0.4	\$0.3
Private Sector Partners	\$91.4	\$14.6	\$2.4	\$3.5	\$1.7

\* Appropriated Funding

## Key Milestones

FY91	FY92	FY93	FY94	FY95	FY96	FY97	FY98
	Pre-award	Design and Construction			Operation		
	Cooperative agreement awarded 10/20/92		Ground-breaking/construction started 4/93		Completed 6/95		
	Design completed 4/93			Environmental monitoring plan completed 12/1/94		Project completed/final report issued 8/98*	

\* Projected date